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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/623,904 | 07/21/2003 | Kenneth E. Welker | 14.0246-US | 7670 |

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| EXAMINER | |
|---|---|
| HUGHES, SCOTT A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 3663 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 05/29/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 10/623,904 | Applicant(s) WELKER ET AL. | |
|---|---|---|---|
| | Examiner SCOTT A. HUGHES | Art Unit 3663 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on _07 March 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) _5,6,18,25,30 and 35_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _5,6,18,25,30 and 35_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _21 July 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

In view of the Appeal Brief filed on 3/7/2008, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Jack W. Keith/

Supervisory Patent Examiner, Art Unit 3663.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-6, 18, 30, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Orban (6353577) and Bittleston (US20020126575).

With regard to claim 5, Stephen discloses determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Bittleston teaches that changes in orientation (angles and inclination) are caused by movements ([0023-0028]). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]). From the teaching of Bittleston that movement of a device is indicated by a change in its measured orientation, it would be obvious that changes in the orientation

measured by Stephen would be an indication that the cable to which they are attached has moved (at least showing movement in the angular position, or roll, as described by Bittleston). Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in determination of the local gravity effect on the sensor for finding orientation.

With regard to claim 6, Stephen discloses that the ocean bottom cable comprises a plurality of orientation sensors coupled thereto (Figs. 1, 2a,b), and that the comparing comprises comparing a plurality of initial orientation values to a plurality of current values of the orientation sensor (Column 2; Column 3, line 60 to Column 4, Line 63). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]).

With regard to claim 18, Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic

sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Bittleston teaches that changes in orientation (angles and inclination) are caused by movements ([0023-0028]). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]). From the teaching of Bittleston that movement of a device is indicated by a change in its measured orientation, it would be obvious that changes in the orientation measured by Stephen would be an indication that the cable

to which they are attached has moved (at least showing movement in the angular position, or roll, as described by Bittleston). Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in determination of the local gravity effect on the sensor for finding orientation.

With regard to claim 30, Stephen discloses an article comprising one or more machine-readable storage media containing instructions that enable a processor to perform a method (described below) (Column 2, Lines 25-65; Column 4, Line 53 to Column 5, Line 5). Stephen discloses determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current

values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Bittleston teaches that changes in orientation (angles and inclination) are caused by movements ([0023-0028]). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]). From the teaching of Bittleston that movement of a device is indicated by a change in its measured orientation, it would be obvious that changes in the orientation measured by Stephen would be an indication that the cable to which they are attached has moved (at least showing movement in the angular position, or roll, as described by Bittleston). Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to

use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in determination of the local gravity effect on the sensor for finding orientation.

With regard to claim 35, Stephen discloses means for determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses means for determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses means for comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state there are means for determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Bittleston teaches that changes in orientation (angles and inclination) are caused by movements ([0023-0028]). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]). From the teaching of Bittleston that movement of a device is indicated by a change in its measured orientation, it would be

obvious that changes in the orientation measured by Stephen would be an indication that the cable to which they are attached has moved (at least showing movement in the angular position, or roll, as described by Bittleston). Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in determination of the local gravity effect on the sensor for finding orientation.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Analog Devices (ADXL202E) and Bittleston (US20020126575).

With regard to claim 25, Stephen discloses a system for carrying out a seismic survey (abstract; Column 1, Line 65 to Column 2, Line 56). Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least

one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Bittleston teaches that changes in orientation (angles and inclination) are caused by movements ([0023-0028]). Bittleston further teaches that progressively changing (comparison of one to the other) values of angle (orientation) are caused by movement ([0028]). From the teaching of Bittleston that movement of a device is indicated by a change in its measured orientation, it would be obvious that changes in the orientation measured by Stephen would be an indication that the cable to which they are attached has moved (at least showing movement in the angular position, or roll, as described by Bittleston). Stephen discloses that accelerometers are

used as the orientation sensors, but does not disclose the specific type of accelerometer used. Stephen does state that the accelerometers can be piezoelectric, piezoresistive, or capacitive accelerometers (Column 5). Analog Devices (ADXL202E, 2000) teaches a capacitative, dual axis accelerometer formed on an integrated circuit chip that can be used to sense accelerations due to gravity (Pages 1, 8-12). It would have been obvious to modify Stephen to include the dual axis accelerometer formed on an integrated circuit chip as taught by Analog Devices as the accelerometers used to sense accelerations due to gravity in order to be able to measure full 360 degrees of orientation through gravity.

Claims 5-6, 18, 30, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Orban (6353577) and Sato (6229102).

With regard to claim 5, Stephen discloses determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining

whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Sato teaches that movements of a device are shown by changes in its orientation as measured by accelerometers (Figs. 1-7, 28) (abstract; Column 5, Line 30 to Column 6, Line 22; Column 8, Line 66 to Column 12, Line 14). As taught by Sato, movement of an object (act of handwriting) causes changes in the inclination of the object as measured by accelerometers. Therefore, it would be obvious that changes in inclination measured by the accelerometers in Stephen would be indicative movement as taught in Sato. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in determination of the local gravity effect on the sensor for finding orientation.

With regard to claim 6, Stephen discloses that the ocean bottom cable comprises a plurality of orientation sensors coupled thereto (Figs. 1, 2a,b), and that the comparing comprises comparing a plurality of initial orientation values to a plurality of current values of the orientation sensor (Column 2; Column 3, line 60 to Column 4, Line 63). Sato also teaches comparing past and current values of an orientation sensor (Figs. 1-7; 34-35) (abstract; Columns 5-6; Column 8, Line 66 to Column 12, Line 14).

With regard to claim 18, Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has

moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Sato teaches that movements of a device are shown by changes in its orientation as measured by accelerometers (Figs. 1-7, 28) (abstract; Column 5, Line 30 to Column 6, Line 22; Column 8, Line 66 to Column 12, Line 14). As taught by Sato, movement of an object (act of handwriting) causes changes in the inclination of the object as measured by accelerometers. Therefore, it would be obvious that changes in inclination measured by the accelerometers in Stephen would be indicative movement as taught in Sato. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in due to gravity sensed by accelerometers are in the form of DC signals.

With regard to claim 30, Stephen discloses an article comprising one or more machine-readable storage media containing instructions that enable a processor to

perform a method (described below) (Column 2, Lines 25-65; Column 4, Line 53 to Column 5, Line 5). Stephen discloses determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Sato teaches that movements of a device are shown by changes in its orientation as measured by accelerometers (Figs. 1-7, 28) (abstract; Column 5, Line 30 to Column 6, Line 22; Column 8, Line 66 to Column 12, Line 14). As taught by Sato, movement of an object (act of handwriting) causes changes in the inclination of the object as measured by accelerometers. Therefore, it would be obvious that changes in inclination measured by the accelerometers in Stephen would be indicative movement as taught in Sato. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the

orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in due to gravity sensed by accelerometers are in the form of DC signals.

With regard to claim 35, Stephen discloses means for determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses means for determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses means for comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that there are means for determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the

orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Sato teaches that movements of a device are shown by changes in its orientation as measured by accelerometers (Figs. 1-7, 28) (abstract; Column 5, Line 30 to Column 6, Line 22; Column 8, Line 66 to Column 12, Line 14). As taught by Sato, movement of an object (act of handwriting) causes changes in the inclination of the object as measured by accelerometers. Therefore, it would be obvious that changes in inclination measured by the accelerometers in Stephen would be indicative movement as taught in Sato. Stephen does not disclose that the values of the orientation sensors are values of a DC signal of the sensors. Stephen discloses that accelerometers are used to determine the orientation signals, but does not disclose what type of signal is generated by the accelerometers that allows for the orientation to be determined. Orban teaches accelerometers used to determine orientation of seismic sensing units based upon the sensed acceleration due to gravity (as taught by Stephen) (Column 3). Orban teaches that the accelerations due to gravity (low frequency signals) sensed by the accelerometers are in the form of DC signals (Column 3). It would be obvious to use accelerometers in Stephen that use DC signals to determine accelerations due to gravity as taught by Orban in order to be able to separate out low frequency signals as DC signals for use in due to gravity sensed by accelerometers are in the form of DC signals.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stephen in view of Analog Devices (ADXL202E) and Sato (6229102).

With regard to claim 25, Stephen discloses a system for carrying out a seismic survey (abstract; Column 1, Line 65 to Column 2, Line 56). Stephen discloses at least one ocean bottom cable (Fig. 1) (Column 3, Line 60 to Column 4, Line 15). Stephen discloses at least one seismic sensor 14,15,16 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Line 15 to Column 5, Line 8). Stephen discloses at least one orientation sensor 5,6,7 coupled to the at least one ocean bottom cable (Figs. 2a-c) (Column 4, Lines 8-63). Stephen discloses a signal processing unit (Column 4, Lines 53-63) capable of determining at least one initial value of at least one orientation sensor coupled to at least one ocean bottom cable (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63) and capable of determining at least one current value of the at least one orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63). Stephen discloses calculating the orientation with the accelerometers in real-time, and therefore there are continuous initial and current values of orientation being generated by the accelerometers. Stephen discloses comparing the initial value of the orientation sensor to the current value of the orientation sensor (Column 2, Lines 1-58; Column 3, line 60 to Column 4, Line 63; Column 5, lines 20-45). Stephen does not specifically state that a step of determining whether or not the at least one ocean bottom cable has moved based on the comparison is made, but since the orientation signals generated by the accelerometers are processed in real time, a change in the orientation would be shown in real time. Sato teaches that movements of a device are shown by changes in

its orientation as measured by accelerometers (Figs. 1-7, 28) (abstract; Column 5, Line 30 to Column 6, Line 22; Column 8, Line 66 to Column 12, Line 14). As taught by Sato, movement of an object (act of handwriting) causes changes in the inclination of the object as measured by accelerometers. Therefore, it would be obvious that changes in inclination measured by the accelerometers in Stephen would be indicative movement as taught in Sato. Stephen discloses that accelerometers are used as the orientation sensors, but does not disclose the specific type of accelerometer used. Stephen does state that the accelerometers can be piezoelectric, piezoresistive, or capacitive accelerometers (Column 5). Analog Devices (ADXL202E, 2000) teaches a capacitative, dual axis accelerometer formed on an integrated circuit chip that can be used to sense accelerations due to gravity (Pages 1, 8-12). It would have been obvious to modify Stephen to include the dual axis accelerometer formed on an integrated circuit chip as taught by Analog Devices as the accelerometers used to sense accelerations due to gravity in order to be able to measure full 360 degrees of orientation through gravity.

## *Conclusion*

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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